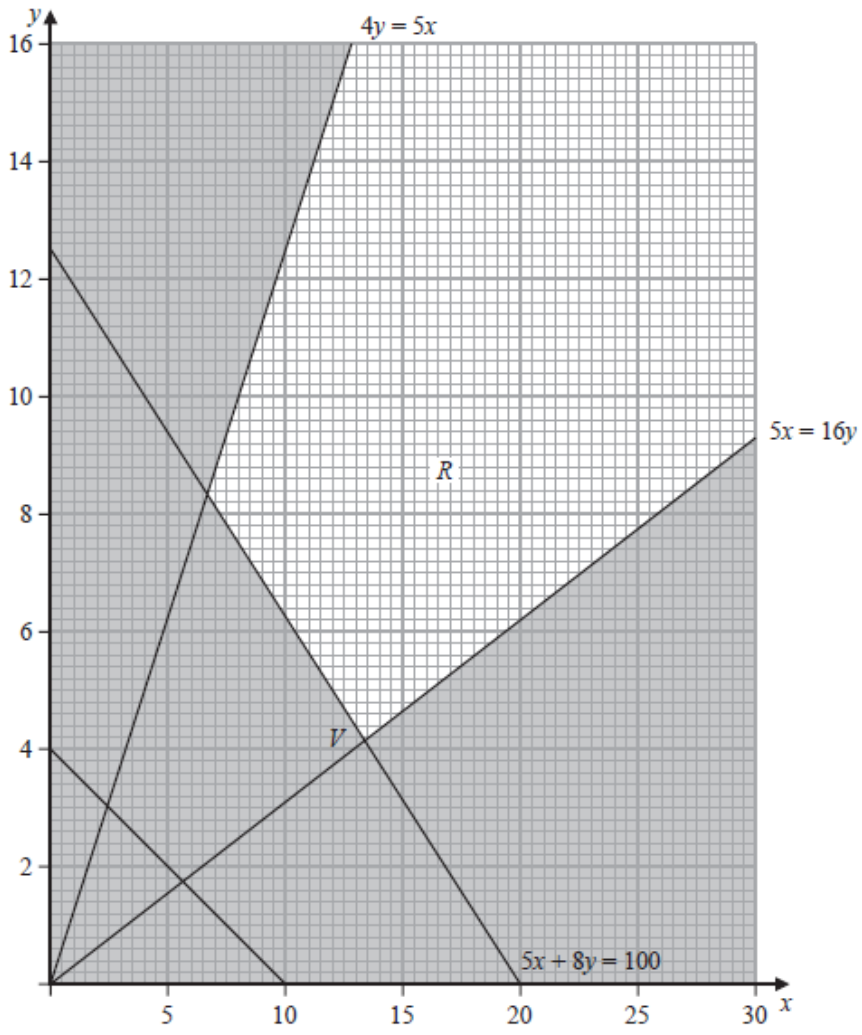
Question Number	Scheme	Marks
7. (a)	Minimise $400x+550y+750z$ Subject to $x+y+z\geq 20$ $x\leq 2(y+z)$ $z\leq \frac{1}{4}(x+y+z)\Rightarrow 3z\leq x+y$	B1 B1 M1 A1 M1 A1 **(6)**
(b)(i)(ii)	Ratio of 5:3 $\Rightarrow 3y=5z$ $x+y+z\geq 20\Rightarrow x+y+\frac{3}{5}y\geq 20$ and $400x+550y+750\left(\frac{3y}{5}\right)$ $5x+8y\geq 100$ and $400x+1000y$	B1 M1 A1 **(3)**
(c)		B1 B1 B1 B1 **(4)**
(d)	Drawing an objective line accept reciprocal gradient Correct objective line V correctly labelled	M1 A1 A1 **(3)**
(e)(i) **(ii)**	Cost is £9800 3 days for senior leaders (12 training days for new teachers, 5 days for middle leaders)	B1 B1 **(2)**
		18 marks

Question Number	Scheme	Marks

Notes for Question 7

a1B1: Expression correct together with 'minimise' or 'min' but not 'minimum' – isw if coefficients are subsequently simpified but $400x + 550y + 750z$ must be seen at some point for this mark to be awarded. The 'min' must appear beside the correct expression

a2B1: CAO ($x + y + z \geq 20$)

a1M1: $x \square 2(y+z)$ where $\square$ is any inequality or equals. Accept $2x \leq y + z$ for this mark

a1A1: CAO $x \leq 2(y+z)$ or equivalent but only one term in each variable and integer coefficients

a2M1: $z \square \frac{1}{4}(x+y+z)$ where $\square$ is any inequality or equals – allow 0.25 but do not allow

$z \square 25\%(x+y+z)$ unless recovered to a fraction or decimal later

a2A1: CAO $3z \leq x + y$ or equivalent but only one term in each variable and integer coefficients

bi1B1: Ratio expressed correctly as an equation $3y = 5z$ (oe) (possibly implied by subsequent working)
bii1M1: Their linear equation in y and z only (must be of the form $ay = bz$ oe) substituted into their constraint and their objective to eliminate z **or** one correct answer simplified
b1A1: CAO $5x + 8y \geq 100$ and $400x + 1000y$ (allow ISW if correct objective simplified)

In **(c)**

$5x + 8y = 100$ must pass if extended within one small square of its intersection with the axes – (0, 12.5) and (20, 0) but must be long enough to define the correct feasible region
$4y = 5x$ must pass within one small square of its intersection with the origin and (10, 12.5)
$5x = 16y$ must pass within one small square of its intersection with the origin and (20, 6.25)

c1B1: One line correct
c2B1: Two lines correct
c3B1: All three lines correct
c4B1: Region, R, correctly labelled – not just implied by shading – dependent on scoring the first three marks in this part

d1M1: Drawing their objective line (based on their answer to (b)) or its reciprocal - line must be correct to within one small square if extended from axis to axis. If their line is shorter than (0, 1) to (2.5, 0) then M0
d1A1: Drawing a **correct** objective line subject to the conditions above regarding length and if extended from axis to axis
d2A1: V labelled clearly on their graph (so dependent on the first three marks in (c) and the previous A mark in this part)

eiB1: CAO – condone lack of units – dependent on the first three marks in (c) and the first two marks in (d)
eiiB1: CAO (3) – dependent on the first three marks in (c) and the first two marks in (d)

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